BILL

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XB891]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to BNSF Railway Bridge Heavy Maintenance Project in King County, Washington

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of two incidental harassment authorizations.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued two consecutive IHAs to the BNSF Railway (BNSF) to incidentally harass, by Level a and Level B harassment, marine mammals over 2 years during construction associated with the Railway Bridge Heavy Maintenance Project in King County, Washington.

DATES: The Year 1 Authorization is effective from July 16, 2022 to July 15, 2023. The Year 2 Authorization is effective from July 16, 2023 to July 15, 2024

FOR FURTHER INFORMATION CONTACT: Robert Pauline, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the "take" of marine mammals, with certain exceptions. sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are proposed or, if the taking is limited to harassment, a notice of a proposed incidental harassment authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as "mitigation"); and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

Summary of Request

On August 17, 2021, NMFS received a request from BNSF Railway (BNSF) for two consecutive IHAs allowing the take of marine mammals incidental to construction associated with the Railway Bridge 0050-0006.3 (Bridge 6.3) Heavy Maintenance Project in King County, Washington. The application was deemed adequate and complete on November 22, 2021. BNSF's request is for take of a small number of seven species of marine mammal by Level B harassment and Level A harassment. Neither BNSF nor

NMFS expects serious injury or mortality to result from this activity and, therefore, IHAs are appropriate.

Description of Planned Activity

Overview

The purpose of this project is to extend the service life of the existing structure by replacing several components of the existing movable span including replacing the existing counterweight, counterweight trunnion bearings, and rocker frame system of the existing movable span. This work would occur over 2 years, requiring the issuance of two consecutive IHAs. BNSF is planning to engage in maintenance activities at Bridge 6.3, a bridge with a movable deck to allow vessels to pass. In-water activities that could result in take of marine mammals include impact pile driving of 36-inch temporary steel piles (which will be removed via cutting with Broco Rod which is not likely to cause take), vibratory installation and extraction of 14-inch H-piles, vibratory installation and extraction of 12-inch timber piles, hydraulic clipper cutting and extraction of 12-inch timber piles, drilling of 48-inch diameter shafts using oscillator rotator equipment, and removing the pile created by filling the drilled shaft and steel casing with concrete and removing the casing with a diamond wire saw. BSNF estimates that the project will requires approximately 122 days of in-water work over 24 months. The IHAs would be effective from July 16, 2022 to July 15, 2023 for Year 1, which would include 113 days of in-water activities and July 16, 2023 to July 15, 2024 for Year 2, which would include 9 days of in-water activities. Table 1 provides a summary of the pile driving activities.

A detailed description of the planned testing activities is provided in the **Federal Register** notice of the proposed IHAs (87 FR 4844; January 31, 2022). Since that time, no changes have been made to the project activities. Therefore, a detailed description is not provided here. Please refer to that **Federal Register** notice for the description of the specified activities.

Table 1—Summary of Pile Driving Activities and User Spreadsheet Inputs

Pile Size	Pile Type	Construction Method	Piles/Shafts per Day	Minutes/ Strikes per pile	Length of Activity (Days)
36 inch	Steel pipe	Impact	6	1,000	20
14 inch	H-pile	Vibratory	8	30	6
12 inch	Timber Pile	Vibratory	10	15	8
12 inch	Timber Pile	Hydraulic Pile Clipper	20	4	4
48-inch	Steel Shaft	Oscillator	0.25	1,920	88
48-inch	Steel-encased Concrete Shaft	Diamond bladed wire saw	4	60	6

Comments and Responses

A notice of NMFS's proposal to issue IHAs to DAF was published in the **Federal Register** on January 31, 2022 (87 FR 4844). That proposed notice described, in detail, BNSF's activities, the marine mammal species that may be affected by the activities and the anticipated effects on marine mammals. During the 30-day public comment period, NMFS received no public comments or comments from the Marine Mammal Commission.

Changes From the Proposed IHAs to Final IHAs

No changes have been made from the notice of proposed IHAs.

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SARs;

https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS's website (*https://www.fisheries.noaa.gov/find-species)*.

Table 2 lists all species or stocks for which take is expected and authorized for this action, and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. For taxonomy, we follow Committee on Taxonomy (2021). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS's SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS's stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS's U.S. SARs (*e.g.*, Carretta *et al.,* 2021a). All values presented in Table 2 are the most recent available at the time of publication and are available in the 2020 U.S. Pacific SARs (Carretta *et al.,* 2021a) and 2021 draft Pacific and Alaska SARs (Carretta *et al.,* 2021b, Muto *et al.,* 2021) available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports*.

Table 2—Species Authorized for Take

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[a]	Stock abundance (CV, N_{min}, most recent abundance survey)[b]	PBR	Annual M/SI[c]
Order Cetartiodactyla – Cetacea – Superfamily Odontoceti (toothed whales, dolphins, and porpoises)						
Family Balaenopteridae (rorquals)						
Minke whale	*Balaenoptera acutorostrata*	California/Oregon/ Washington	-, -, N	915 (0.792, 509, 2018)	4.1	≥ 0.59
Family Delphinidae						
Common Bottlenose Dolphin	*Tursiops truncatus*	California/Oregon/ Washington offshore	-, -, N	3,477 (0.696, 2,048, 2018)	19.70	0.82
Long-beaked Common Dolphin	*Delphinus capensis*	California	-, -, N	83,379 (0.216, 69,636, 2018)	668	≥29.7
Family Phocoenidae (porpoises)						
Harbor porpoise	*Phocoena phocoena*	Washington Inland Waters	-, -, N	11,233 (0.37, 8,308, 2015)	66	≥7.2
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California Sea Lion	*Zalophus californianus*	United States	-, -, N	257,606 (N/A, 233,515, 2014)	14,011	>320
Steller sea lion	*Eumetopias jubatus monteriensis*	Eastern U.S.	-, -, N	43,201[e] (see SAR, 43,201, 2017)	2,592	113
Family Phocidae (earless seals)						
Harbor seal	*Phoca vitulina*	Washington Northern Inland Waters	-, -, N	1,088 (0.15, UNK, 1999)[f]	NA	10.6

[a] - ESA status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[b]- NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.* CV is coefficient of variation; Nmin is the minimum estimate of stock abundance.

[c] - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.*, commercial fisheries, ship strike). Annual mortality/serious injury (M/SI) often cannot be determined precisely and is in some cases presented as a minimum value or range.

[d]- Based on counts of individual animals identified from photo-identification catalogues. Surveys for abundance estimates of these stocks are conducted infrequently.

[e] - Best estimate of pup and non-pup counts, which have not been corrected to account for animals at sea during abundance surveys.

[f]- The abundance estimate for this stock is greater than eight years old and is therefore not considered current. PBR is considered undetermined for this stock, as there is no current minimum abundance estimate for use in calculation. We nevertheless present the most recent abundance estimates, as these represent the best available information for use in this document.

A detailed description of the species likely to be affected by BNSF's activities, including brief information regarding population trends and threats, and information regarding local occurrence, were provided in the **Federal Register** notice for the proposed IHA (87 FR 4844; January 31, 2022). Since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** notice for those descriptions. Please also refer to NMFS's website (*https://www.fisheries.noaa.gov/find-species*) for generalized species accounts.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of testing activities have the potential to result in behavioral harassment of marine mammals in the vicinity of the study area. The **Federal Register** notice for the proposed IHAs (87 FR 4844; January 31, 2022) included a discussion of the effects of anthropogenic noise on marine mammals and their habitat, therefore that information is not repeated here; please refer to the **Federal Register** notice (87 FR 4844; January 31, 2022) for that information.

Estimated Take

This section provides an estimate of the number of incidental takes authorized through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, section 3(18) of the MMPA defines "harassment" as any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would primarily be by Level B harassment, as use of the acoustic sources for pile installation and extraction has the potential to result in disruption of behavioral patterns for individual marine mammals. There is also some potential for auditory injury (Level A harassment) to result, primarily for harbor seals, because predicted auditory injury zones are large. Auditory injury is unlikely to occur for low-frequency cetaceans, mid-frequency cetaceans, high-frequency cetaceans, and otariids. The planned mitigation and monitoring measures are expected to minimize the severity of the taking to the extent practicable.

As described previously, no mortality is anticipated or authorized for this activity. Below we describe how the take is estimated.

Generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) the number of days of activities. We note that while these basic factors can contribute to a basic calculation to provide an initial prediction of takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.,* previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the authorized take estimate.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 µPa (rms) for continuous (*e.g.,* vibratory pile-driving, drilling) and above 160 dB re 1 µPa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources.

BNSF's planned activity includes the use of continuous (vibratory pile driving and removal, oscillator rotator equipment, wire saw cutting, clipping) and impulsive (impact pile driving) equipment, and therefore both the 120- and 160-dB re 1 µPa (rms) thresholds are applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). BNSF's planned activity includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving) sources.

These thresholds are provided in Table 3 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2018 Technical Guidance, which may be accessed at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

Table 3—Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1* $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	*Cell 2* $L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	*Cell 4* $L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	*Cell 6* $L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 7* $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	*Cell 8* $L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	*Cell 10* $L_{E,OW,24h}$: 219 dB

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds, which include source levels and transmission loss coefficient.

The following pile sizes and installation/extraction methods were analyzed:

- 36-inch steel pipe pile, impact installation, with 5 dB bubble curtain source level reduction under two installation scenarios (1 pile driver or 2 concurrent pile drivers);
- 48-inch steel pipe pile, oscillator installation (drilled shaft);
- 48-inch steel pipe pile, diamond wire saw cutting;
- 14-inch steel H-pile, vibratory installation/extraction;
- 12-inch timber pile, vibratory installation/extraction; and
- 12-inch timber pile, pile clipper extraction.

Impact pile driver installation of 36-inch steel pipe piles analyzed a worst-case scenario consisting of two crews driving 36-inch steel pipe piles simultaneously (Scenario 2) in order to provide maximum flexibility should multiple crews become necessary during construction. It is likely, however, that only one crew will operate at one time (Scenario 1). Based on NMFS guidance, decibel addition is not considered in the 36-inch steel pipe pile impact analysis since during impact hammering or other impulsive sources, it is unlikely that the two hammers would strike at the same exact instant (or within the 0.1 second average pulse duration). Therefore, the sound source levels will not be adjusted regardless of the distance between the hammers and each source will be analyzed separately.

Vibratory pile driving of 14-inch H-piles, and vibratory and pile clipper extraction of 12-inch timber piles (residential structures demolition) were analyzed in the event these methods become necessary (if, for instance, crane weight alone cannot seat the 14-inch H-piles for the turbidity screen installation or crane torque alone cannot extract timber piles by direct pulling/twisting).

This analysis uses in-water source sound levels for vibratory and impact pile driving from Washington State Department of Transportation Biological Assessment

Manual (WDSOT 2020), and California Department of Transportation Division (Caltrans 2015). Analysis of drilled shaft installation used sound source data came from (*HDR, 2011*. Diamond wire saw cutting and hydraulic pile clipper cutting came from the Navy (2019). Source sound levels for each analysis were measured at 10m from the source and based on other projects with the same pile type and size, installation/extraction technique, and similar substrate if no project site-specific information is available.

In cases where multiple sources were provided from the above references, the following methodology was used to select in-water source sound levels to generate a proxy:

1. Select first by corresponding pile size and type;

2. Eliminate those that do not have substrates similar to the project site substrate (*i.e.,* sandy silt intermixed with gravels and riprap); and

3. Of the remaining, select highest source sound level to be conservative.

All piles driven and/or proofed with an impact hammer would use a bubble curtain. It is estimated that use of a bubble curtain would result in a minimum of a 5-dB reduction in underwater sound levels during 36-inch pipe pile driving, and this reduction has been included in the estimate to account for a reasonably achievable reduction in sound during underwater construction activity. Source sound levels are summarized in Table 4.

Table 4—In-Water Sound Source Levels

Pile Size	Pile Type	Source	Construction Method	dB Peak	dB RMS	dB Single-Strike SEL
36 inch	Steel pipe	Caltrans, 2015. 36-inch steel pipe pile Table I.2-1	Impact	208	190	180
14 inch	H-pile	Caltrans, 2015. 12-inch steel H-pile proxy Table I.2-2.	Vibratory	—	150	—
12 inch	Timber Pile	Greenbusch Group, 2018. 12-inch timber pile	Vibratory	—	152	—

12 inch	Timber Pile	NAVFAC SW 2020 Compendium. 13-inch round polycarbonate pile	Hydraulic Pile Clipper	—	154	—
48-inch	Steel Shaft	HDR Alaska, Inc., 2011. 144-inch steel shaft proxy	Oscillator	—	143.8	—
48-inch	Steel-encased Concrete Shaft	NAVFAC SW 2020 Compendium. 66-inch steel encased concrete-filled caisson proxy	Diamond bladed wire saw	—	161.5	—

Transmission loss (TL), expressed as decibels, is the reduction in a specified level between two specified points R_1, R_2 that are within an underwater acoustic field. By convention, R_1 is chosen to be closer to the source of sound than R_2, such that transmission loss is usually a positive quantity. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

$$TL = B * Log_{10} (R_2/R_1),$$

where

TL = transmission loss in dB

B = transmission loss coefficient

R_1 = distance from source to distance at which the level is estimated (typically 10-m for pile driving)

R_2 = distance from source to the isopleth associated with the applicable acoustic threshold

Absent site-specific acoustical monitoring with differing measured transmission loss, a practical spreading value of 15 is used as the transmission loss coefficient in the above formula. Site-specific transmission loss data for BNSF bridge site is not available, therefore the default coefficient of 15 is used to determine the distances to the Level A and Level B harassment thresholds.

When the NMFS Technical Guidance (2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, we developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which may result in some degree of overestimate of Level A harassment take. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources, NMFS User Spreadsheet predicts the distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would incur PTS. Inputs used in the User Spreadsheet are shown in Table 5 and the resulting isopleths are reported below in Table 6.

Table 5—User Spreadsheet Input Parameters Used for Calculating Level A Harassment Isopleths

	36-inch steel (scenario 1)	36-inch steel - 2 concurrent (Scenario 2)	14-inch. steel H-pile vibratory install	12-inch timber vibratory extraction	48-inch steel Oscillator	48-inch Wire saw cutting	12-inch timber clipper cutting
Spreadsheet Tab Used	E.1) Impact pile driving	E.1) Impact pile driving	A.1) Vibratory pile driving	A.1) Vibratory pile driving	A) stationary source (non-impulsive, continuous)	A) stationary source (non-impulsive, continuous)	A) stationary source (non-impulsive, continuous)
Source Level (Single Strike/shot SEL) and Peak or RMS	175 SEL/ 203 Peak	175 SEL/ 203 Peak	150 RMS	152 RMS	143.8 RMS	161.5 RMS	154 RMS
Weighting Factor Adjustment (kHz)	2	2	2.5	2.5	2.5	2.5	2.5
a) Number of strikes per pile	1000	1000					
Number piles or shafts per day	6	12	8	10	0.25	4	20
Duration for single pile (min)			30	15	1920	60	4

Note transmission loss coefficient for all sources is 15 and all source level values quoted are at 10m distance.

Table 6—Calculated Distances to Level A and Level B Harassment Isopleths

Pile Type, Size, and Pile Driving Method	Level A Zone (meters)					Level B Harassment Zone (meters)
	LF cetacean	MF cetacean	HF cetacean	Phocid	Otariid	
Scenario 1. 36-inch Steel PipeImpact Drive (Year 1)	966	34	1,150	517	38	464
Scenario 2. 36-inch Steel PipeImpact Drive (Year 1)	1,533	55	1,826	820	60	464
14-inch H-Pile Vibratory (Year 1, Year 2)	3	1	5	2	1	1,000
12-inch Timber Vibratory (Year 1)	3	1	5	2	1	1,359
48-inch Drilled Shaft Oscillatory Installation (Year 1)	0.2	0	0.2	0.1	0	386
48-inch Concrete-lined Steel Shaft Diamond Wire Saw Removal Year 2)	1.9	0.2	2.7	1.1	0.1	5,843
12-inch Timber Pile Clipper Year 1)	0.6	0	0.6	0.3	0	1,848

Marine Mammal Occurrence and Take Calculation and Estimation

In this section we provide the information about the presence, density, or group dynamics of marine mammals and how it is brought together to produce a quantitative take estimate.

Take estimates were calculated using a combination of best available data. Best available density data was for the most part from the U.S. Department of the Navy's Marine Species Density Database Phase III for the Northwest Training and Testing Study Area (Navy 2019) which includes seasonal density estimates: Winter (Dec-Feb), Spring (Mar-May), Summer (Jun-Aug), Fall (Sep-Nov). The project will not work in-water in the Spring as that season is outside the July 16 – February 15 in-water work season. The most conservative (highest density) seasonal estimate from the remaining three seasons was used where seasonal overlap exists and densities differ across seasons. Estimated

take was calculated using density estimates multiplied by the area of each Level B harassment zone for each pile type multiplied by the number of days of in-water activity for each pile type. In some instances and where noted, observation-based data from WSDOT's Seattle Multimodal Project at Colman Dock Season Three Marine Mammal Monitoring Report (WSDOT 2020a) or other observational data was used instead of US Navy data when Navy density data was zero or extremely low.

BNSF plans to work in-water for 113 days in Year 1 and 9 days in Year 2, or approximately 5.5 months assuming a 5-day work week for 23 weeks in Year 1 and a half a month assuming a 5-day work week for 2 weeks in Year 2,

Minke Whale

The estimated take was calculated as described above using the Navy's density data which resulted in zero takes of minke whale for both Year 1 and Year 2 as shown in Table 7. Therefore, as described above, we looked at other observational data. The WSDOT Seattle Multimodal Project at Colman Dock Year 3 IHA Monitoring Report observed minke whale presence indicates sightings of a single minke whale over 7 months (WSDOT 2020a). Given this information, BNSF and NMFS conservatively assumed that up to one whale per month could be taken by harassment.

A shutdown zone at the full distance of the level A harassment isopleths (≤ 1533 m) will be applied to avoid take by Level A harassment.

The 113 days of work in Year 1 and 9 days in Year 2, equates to 5.5 months × 1 minke whale/month = 6 encounters with minke whales in Year 1 and 0.5 months x 1 Minke whale/month = 1 whale in Year 2. Therefore, BNSF has requested and NMFS has authorized 6 takes by Level B harassment in Year 1 and 1 take by Level B harassment in year in Year 2.

Table 7—Calculated Take of Minke Whale

Activity	Species Density (animals/km^2)	Level A Area (km^2)	Level B Area (km^2)	Length of Activity (days)	Year 1 Estimated Take A	Year 1 Estimated Take B	Year 2 Estimated Take A	Year 2 Estimated Take B
Impact 36-inch Steel Pipe Pile (2 Concurrent Drivers)	0.0000054	0.376	0.183	10 (Yr 1)	0	0	--	--
Vibratory 14-inch H-Pile	0.0000054	0.005	0.235	6 (3 Yr 1, 3 Yr 2)	0	0	0	0
Vibratory 12-inch Timber Pile	0.0000054	0.005	0.286	8 (Yr 1)	0	0	--	--
Oscillator Install of 4-foot Drilled Shaft	0.0000054	0.000	0.169	88 (Yr 1)	0	0	--	--
Diamond Wire Saw Removal of 48--inch Drilled Shaft	0.0000054	0.000	2.290	6 (Yr 2)	--	--	0	0
24-inch Pile Clipper Removal of 12-inch Timber Pile	0.0000054	0.000	0.381	4 (Yr 1)	0	0	--	--

Common Bottlenose Dolphin

Estimated take using the Navy's density estimates for common bottlenose dolphins as described above resulted in zero take in both Year 1 and Year 2 as shown in Table 8. Therefore, as described above, we looked at other observational data. Common bottlenose dolphins have been rare visitors to Puget Sound. However, the WSDOT Seattle Multimodal Project at Colman Dock Year 3 IHA monitoring report observed common bottlenose dolphin at a rate of 6 per month (WSDOT 2020a). In-water work will occur for 113 days in Year 1 and 9 days in Year 2, which would equate to 33 dolphin takes in Year 1 (5.5 months × 6 dolphins/month) and 3 dolphin takes in Year 2 (0.5 months x 3 dolphins/month). A shutdown zone at the full distance of the level A harassment isopleths (≤ 55m) can be effectively applied to avoid Level A take. Therefore, BNSF has requested and NMFS has authorized 33 takes by Level B harassment in Year 1 and 3 takes by Level B harassment in year in Year 2.

Table 8—Calculated Take of Bottlenose Dolphin

Activity	Species Density (animals/km^2)	Level A Area (km^2)	Level B Area (km^2)	Length of Activity (days)	Year 1 Estimated Take A	Year 1 Estimated Take B	Year 2 Estimated Take A	Year 2 Estimated Take B
Impact 36-inch Steel Pipe Pile (2 Concurrent Drivers)	0.0000054	0.376	0.183	10 (Yr 1)	0	0	--	--
Vibratory 14-inch H-Pile	0.0000054	0.005	0.235	6 (3 Yr 1, 3 Yr 2)	0	0	0	0
Vibratory 12-inch Timber Pile	0.0000054	0.005	0.286	8 (Yr 1)	0	0	--	--
Oscillator Install of 4-foot Drilled Shaft	0.0000054	0.000	0.169	88 (Yr 1)	0	0	--	--
Diamond Wire Saw Removal of 48-inch Drilled Shaft	0.0000054	0.000	2.290	6 (Yr 2)	--	--	0	0
24-inch Pile Clipper Removal of 12-inch Timber Pile	0.0000054	0.000	0.381	4 (Yr 1)	0	0	--	--
Total				122	0	0	0	0

Long-Beaked Common Dolphin

Using the Navy's density data, which was zero, estimated take of common dolphins was calculated to be zero in Year 1 and Year 2. Therefore, as described above, we looked at other observational data. Sightings of live dolphins throughout inside waters and Southern Puget Sound have been recorded in 2003, 2011-12, and 2016 –17. Group size ranged from 2 (in 2003 and 2011-12) to 5-12 (in 2016-2017) (Shuster *et al.* 2017). Since June 2016, several common dolphins have remained in Puget Sound, group sizes of 5-20 individuals are often reported and some of these groups stayed in the region for several months. Sightings of these animals mostly began in summer and early fall sometimes extending into winter months. (Shuster *et al.,* 2018). We conservatively predict that a group of 20 individuals will be taken on a monthly basis. The Level A harassment shutdown zone for mid-frequency hearing group will be implemented to minimize the severity of any Level A harassment that could occur. The in-water work would occur for 113 days in Year 1 and 9 days in Year 2, which would result in 110 takes (5.5 months × 20 dolphins/month) in Year 1 and 20 takes (1 month x 20 dolphins/month) in Year 2 by Level B harassment. BNSF has requested and NMFS has authorized 110 takes of long-beaked common dolphin by Level B harassment in Year 1 and 10 takes by Level B harassment in year in Year 2.

Harbor Porpoise

Harbor porpoise density estimates based on the Navy's data were used to calculate requested and authorized take as shown in Table 9. Analysis of the size of the level A harassment zones multiplied by density associated with harbor porpoise predicted that two porpoises could be taken by Level A harassment during the 10 days that concurrent driving of 36-in steel piles occurs during year 1. However, take by Level A harassment is unlikely given that the threshold and associated PTS isopleth is based on the acoustic energy accrued over a specified time period and it is unlikely that a highly

mobile animal such as the harbor porpoise would spend the that amount if time in the Level A harassment zone. However, given the larger size of the zone and the cryptic nature of harbor porpoises, we have precautionarily authorized 2 takes by Level A harassment for Year 1. The Level A harassment shut down zone for high frequency hearing group will be implemented to minimize severity of any Level A harassment takes that do occur. Since there will be no impact driving during Year 2, the size of the Level A harassment zone will not exceed 5 m and, therefore, no take by Level A harassment was requested and none has been authorized. BNSF has requested and NMFS has authorized 12 takes of harbor porpoise by Level B harassment in Year 1 and 8 takes by Level B harassment in year in Year 2.

Table 9—Calculated Take of Harbor Porpoise

Activity	Species Density (animals/km^2)	Level A Area (km^2)	Level B Area (km^2)	Length of Activity (days)	Year 1 Estimated Take A	Year 1 Estimated Take B	Year 2 Estimated Take A	Year 2 Estimated Take B
Impact 36-inch Steel Pipe Pile (2 Concurrent Drivers)	0.54	0.376	0.183	10 (Yr 1)	2	1	--	--
Vibratory 14-inch H-Pile	0.54	0.005	0.235	6 (3 Yr 1, 3 Yr 2)	0	1	0	1
Vibratory 12-inch Timber Pile	0.54	0.005	0.286	8 (Yr 1)	0	1	--	--
Oscillator Install of 4-foot Drilled Shaft	0.54	0.000	0.169	88 (Yr 1)	0	8	--	--
Diamond Wire Saw Removal of 48-inch Drilled Shaft	0.54	0.000	2.290	6 (Yr 2)	--	--	0	7
24-inch Pile Clipper Removal of 12-inch Timber Pile	0.54	0.000	0.381	4 (Yr 1)	0	1	--	--
Total				122	2	12	0	8

Harbor Seal

Harbor seal density estimates based on data from the Navy were initially used to calculate requested and authorized take (Table 10). These estimates, however, do not account for numerous seals feeding on migrating salmonids at Ballard Locks, especially during.summer (June – September) months. A new acoustic deterrent device was tested over two years to keep seals away from the Locks (Bogaard, Pers. Comm, 2022). A study report is currently being developed for publication. Study observers were primarily focused on behavioral effects of the deterrent on seals and monitored seal behavioral reactions during 30 minute observation periods up to eight times per day. Actual seal abundance was not recorded. However, observers noted that groups of 5-6 harbor seals were very common from late June through September during the salmon run, although smaller numbers were present throughout the year. It is likely that many of the same animals were observed multiple times across daily observation periods. The in-water work window runs from July 16, 2022 through February 15, 2023. Given this information, NMFS assumed for Year 1 that during the 54 in-water work days between July 16, 2022 and September 30, 2022, 5 harbor seals would be taken per day (270 takes). For the remaining 59 in-water work days between October 1, 2022 and February 15, 2023, a single harbor seal would be taken per day (59) for a total of 329 takes. There are 10 in-water work days that include concurrent impact driving of 36-inch piles when the Level A harassment isopleth is relatively large (1,826 m) (and also exceeds the Level B harassment isopleth (464 m)) so it is possible that Level A harassment could occur in some animals. Also, note that the constrained design of the lock system means that seals would likely spend extended periods in the confined area while feeding. NMFS conservatively assumes that all of these 10 in-water work days would occur during salmon migration (February 15 – Sept 30) and that up to one-third of seals taken per day (2) could be exposed to sound energy levels resulting in some degree of Level A

harassment (20). The estimated takes by Level A harassment is subtracted from the Level B harassment take to avoid double-counting. Since a smaller number of seals expected to be present during non-migratory period and the seals would have little incentive to congregate near the locks in the absence of salmon, NMFS does not expect any Level A harassment of seals to occur. Therefore, NMFS is proposing during Year 1 to authorize 20 takes by Level A harassment and 309 takes by Level B harassment (329-20).

For Year 2, NMFS assumed that all 9 in-water work days would occur during salmon migration between July 16, 2023 and September 30, 2024 with up to 6 harbor seals taken per day (54). No Level A take harassment is authorized during Year 2 since the largest Level A isopleth for all planned activities is 2 m. However, the density-based estimate was 57 takes as shown in Table 10. Therefore, NMFS is proposing 57 takes of harbor seal by Level B harassment during Year 2.

Table 10—Calculated Take of Harbor Seal

Activity	Species Density (animals/km^2)	Level A Area (km^2)	Level B Area (km^2)	Length of Activity (days)	Year 1 Estimated Take A	Year 1 Estimated Take B	Year 2 Estimated Take A	Year 2 Estimated Take B
Impact 36-inch Steel Pipe Pile (2 Concurrent Drivers)	3.91	0.215	0.183	10 (Yr 1)	8	7	--	--
Vibratory 14-inch H-Pile	3.91	0.005	0.235	6 (3 Yr 1, 3 Yr 2)	0	3	0	3
Vibratory 12-inch Timber Pile	3.91	0.005	0.286	8 (Yr 1)	0	9	--	--
Oscillator Install of 4-foot Drilled Shaft	3.91	0.005	0.169	88 (Yr 1)	0	58	--	--
Diamond Wire Saw Removal of 48-inch Drilled Shaft	3.91	0.005	2.290	6 (Yr 2)	--	--	0	54
24-inch Pile Clipper Removal of 12-inch Timber Pile	3.91	0.005	0.381	4 (Yr 1)	0	6	--	--
TOTAL				122	8	83	0	57

California Sea Lion

BNSF initially considered California sea lion density estimates to calculate requested take, which resulted in relatively low estimates (4 takes in Year 1 and 3 takes in Year 2 by Level B harassment) as shown in Table 11. However, California sea lions are known to frequent the Ballard Locks to feed on migrating salmon (KUOW, 2020). While no formal research studies have recorded individual numbers of California sea lions at Ballard Locks, news articles reported accounts of California sea lion sightings which ranged from a few to many more (Hakai Magazine, 2018; King 5 News, 2021). Observers associated with the acoustic deterrent device study described above, reported that California sea lions were less numerous than harbor seals, having been seen at a rate of 2-3 per day during peak salmonid migration (Bogaard, Pers. Comm. 2022). They were less common during non-migratory seasons. Given this information, NMFS assumed for Year 1 that during the 54 in-water work days between July 16, 2022 and September 30, 2022, 2 California sea lions would be taken per day (108). For the remaining 59 in-water work days between October 1, 2022 and February 15, 2023, a single California sea lion would be taken very third day (20). Take by Level A harassment is possible, but unlikely, given that the largest Level A harassment isopleth is 60 m (with a 10 m shutdown zone for otariids) but only during 10 in-water work days which would include impact driving during Year 1. The Level A harassment zone during all other in-water work days in both Year 1 and Year 2 is 1 m or less. A California sea lion would not be expected to remain within the injury zone long enough (5.4 hours) to accrue the amount energy that would result in take Level A harassment. As such, NMFS is proposing during Year 1 to authorize 128 takes by Level B harassment. No takes by Level A harassment are authorized.

For Year 2, NMFS assumed that all 9 in-water work days would occur during peak salmon migration between July 16, 2023 and September 30, 2024 with up to 2

California sea lions taken per day (18). NMFS is proposing to authorize 18 takes of California sea lion by Level B harassment. No Level A take harassment is authorized.

Table 11—Calculated Take of California Sea Lions by Level B Harassment

Activity	Species Density (animals/km^2)	Level A Area (km^2)	Level B Area (km^2)	Length of Activity (days)	Year 1 Estimated Take A	Year 1 Estimated Take B	Year 2 Estimated Take A	Year 2 Estimated Take B
Impact 36-inch Steel Pipe Pile (2 Concurrent Drivers)	0.2211	0.023	0.183	10 (Yr 1)	0	0	--	--
Vibratory 14-inch H-Pile	0.2211	0.004	0.235	6 (3 Yr 1, 3 Yr 2)	0	0	0	0
Vibratory 12-inch Timber Pile	0.2211	0.004	0.286	8 (Yr 1)	0	1	--	--
Oscillator Install of 4-foot Drilled Shaft	0.2211	0.000	0.169	88 (Yr 1)	0	3	--	--
Diamond Wire Saw Removal of 48-inch Drilled Shaft	0.2211	0.000	2.290	6 (Yr 2)	--	--	0	3
24-inch Pile Clipper Removal of 12-inch Timber Pile	0.2211	0.000	0.381	4 (Yr 1)	0	0	--	--
TOTAL						4		3

Stellar Sea Lion

Stellar sea lion density estimates were initially used to calculate requested take as shown in Table 12. Based on the density data, BNSF has requested a single take for both Year 1 and Year 2. Given the large number of in-water work days in Year 1, NMFS has precautionarily increased the authorized Level B harassment to 5 takes while maintaining the 1 authorized by Level B harassment as calculated by density estimates in Year 2. Monitors with the acoustic deterrent study did not observe any Steller sea lions during the two years that the study was underway (Bogaard, Pers. Comm, 2022).

Table 12—Calculated Take of Steller Sea Lions by Level B Harassment

Activity	Species Density (animals/km^2)	Level A Area (km^2)	Level B Area (km^2)	Length of Activity (days)	Year 1 Estimated Take A	Year 1 Estimated Take B	Year 2 Estimated Take A	Year 2 Estimated Take B
Impact 36-inch Steel Pipe Pile (2 Concurrent Drivers)	0.0478	0.023	0.183	10 (Yr 1)	0	0	--	--
Vibratory 14-inch H-Pile	0.0478	0.004	0.235	6 (3 Yr 1, 3 Yr 2)	0	0	0	1
Vibratory 12-inch Timber Pile	0.0478	0.004	0.286	8 (Yr 1)	0	0	--	--
Oscillator Install of 4-foot Drilled Shaft	0.0478	0.000	0.169	88 (Yr 1)	0	1	--	--
Diamond Wire Saw Removal of 48-inch Drilled Shaft	0.0478	0.000	2.290	6 (Yr 2)	--	--	0	0
24-inch Pile Clipper Removal of 12-inch Timber Pile	0.0478	0.000	0.381	4 (Yr 1)	0	0	--	--
TOTAL						1		1

The estimated take by Level A and Level B harassment for all authorized species and stocks by year, and percentage take by stock is shown in Table 13.

Table 13—Estimated Take by Level A and Level B Harassment, by Species, Stock and Year, and Percentage Take by Stock

Common Name	Stock	Abundance	IHA Year 1		Total Take as percentage of stock	IHA Year 2		Total Take as percentage of stock.
			Take A Request	Take B Request		Take A Request	Take B Request	
Minke Whale	California/Oregon/ Washington	915	—	6	0.66	—	1	0.11
Common Bottlenose Dolphin	California/Oregon/ Washington offshore	3,477	—	33	0.95	—	3	0.09
Long-beaked Common Dolphin	California	83,379	—	110	0.13	—	20	0.01
Harbor Porpoise	Washington Inland Waters	11,233	—	12	0.11	—	8	0.07
Harbor Seal	Washington Northern Inland Waters	1,088	20	309	32.6	—	57	5.2
California Sea Lion	United States	257,606	—	108	0.04	—	20	<0.01
Stellar Sea Lion	Eastern U.S.	43,201	—	5	0.01	—	1	<0.01

Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned); and

(2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

In addition to the measures described later in this section, BNSF will employ the following mitigation measures:

- BNSF must ensure that construction supervisors and crews, the monitoring team, and relevant BNSF staff are trained prior to the start of activities subject to these IHAs, so that responsibilities, communication procedures, monitoring protocols, and operational procedures are clearly understood. New personnel joining during the project must be trained prior to commencing work;
- Monitoring must take place from 30 minutes prior to initiation of pile driving activity (*i.e.*, pre-start clearance monitoring) through 30 minutes post-completion of pile driving activity;
- If a marine mammal is observed entering or within the shutdown zones indicated in Table 14, pile driving activity must be delayed or halted;
- Pile driving activity must be halted upon observation of either a species for which incidental take is not authorized or a species for which incidental take has been authorized but the authorized number of takes has been met, entering or within the harassment zone (as shown in Table 14); and
- BNSF, construction supervisors and crews, Protected Species Observers (PSOs), and relevant BNSF staff must avoid direct physical interaction with marine mammals during construction activity. If a marine mammal comes within 10 meters of such activity, operations must cease and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions, as necessary to avoid direct physical interaction.

The following mitigation measures apply to BNSF's in-water construction activities:

- *Establishment of Shutdown Zones*- BNSF will establish shutdown zones for all pile driving and removal activities. The purpose of a shutdown zone is generally

to define an area within which shutdown of the activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). Shutdown zones will vary based on the activity type and marine mammal hearing group. In addition to the shutdown zones listed in Table 14, BNSF will shut down construction activity if a humpback or southern resident killer whale is observed approaching or within the specified Level B harassment zone.

- *Protected Species Observers*- The placement of PSOs during all pile driving and removal activities (described in detail in the **Monitoring and Reporting** section) will ensure that the entire shutdown zone is visible during pile driving and removal. Should environmental conditions deteriorate such that marine mammals within the entire shutdown zone would not be visible (*e.g.*, fog, heavy rain), drilling, cutting, clipping, pile driving and removal must be delayed until the PSO is confident marine mammals within the shutdown zone could be detected.

Table 14—Shutdown Zones for each Hearing Group and Level B Harassment Zones during Pile Installation and Removal (meters)

Pile Type, Size, and Pile Driving Method	LF	MF	HF	Phocid	Otariid	Level B Harassment zone
Scenario 1. Single 36-inch Pipe	1,000	40	1,200	10	10	500
Scenario 2. 2 Concurrent 36-inch Pipe	1,600	60	1,900	10	10	500
14-inch H-Pile	10	10	10	10	10	1,000
12-inch Timber Vibratory	10	10	10	10	10	1,400
48-inch Drilled Shaft Oscillatory Installation	10	10	10	10	10	400
48-inch Concrete-lined Steel Shaft Diamond Wire Saw Removal	10	10	10	10	10	5,900

12-inch Timber Pile Clipper	10	10	10	10	10	1,900

- *Monitoring for Level A and Level B Harassment*- BNSF will monitor the Level B harassment zones to the extent practicable and the entire Level A harassment zones. Monitoring zones provide utility for observing by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring zones enable observers to be aware of and communicate the presence of marine mammals in the project area outside the shutdown zone and thus prepare for a potential cessation of activity should the animal enter the shutdown zone. At least three PSOs would monitor harassment zones during all in-water construction activities. PSO monitoring stations are described below in the **Monitoring and Reporting** section.
- *Pre-activity Monitoring*- Prior to the start of daily in-water construction activity, or whenever a break in drilling, clipping, cutting, pile driving/removal of 30 minutes or longer occurs, PSOs will observe the shutdown and monitoring zones for a period of 30 minutes. The shutdown zone will be considered cleared when a marine mammal has not been observed within the zone for that 30-minute period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes. When a marine mammal for which Level B harassment take is authorized is present in the Level B harassment zone, activities may begin and Level B harassment take will be recorded. If the entire Level B harassment zone is not visible at the start of construction, pile driving activities can begin. If work ceases for more than 30 minutes, the pre-activity monitoring of the shutdown zones will commence.

- *Soft Start*- Soft-start procedures are believed to provide additional protection to marine mammals by providing warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. For impact pile driving, contractors will be required to provide an initial set of three strikes from the hammer at reduced energy, followed by a 30-second waiting period. This procedure will be conducted three times before impact pile driving begins. Soft start will be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.
- *Bubble Curtain*- BNSF will use a marine pile-driving energy attenuator (*i.e.*, air bubble curtain system) during impact pile driving. The use of sound attenuation will reduce SPLs and the size of the zones of influence for Level A harassment and Level B harassment. Bubble curtains will meet the following requirements:
    - The bubble curtain must distribute air bubbles around 100 percent of the piling circumference for the full depth of the water column;
    - The lowest bubble ring must be in contact with the substrate for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent substrate contact. No parts of the ring or other objects shall prevent full substrate contact; and
    - Air flow to the bubblers must be balanced around the circumference of the pile.

Based on our evaluation of BNSF's planned measures, NMFS has determined that the required mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

Visual Monitoring

Marine mammal monitoring must be conducted in accordance with the Marine Mammal Monitoring Plan found in Appendix E in the application. Marine mammal monitoring during drilling, clipping, cutting, pile driving and removal must be conducted by NMFS-approved PSOs in a manner consistent with the following:

- Independent PSOs (*i.e.*, not construction personnel) who have no other assigned tasks during monitoring periods must be used;
- At least one PSO must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization;
- Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training for prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization; and
- PSOs must be approved by NMFS prior to beginning any activity subject to this IHA.

PSOs must have the following additional qualifications:

- Ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times, and reason for

implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior; and

- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary;

A minimum of three PSOs located at positions designated in Figure 1 and Figure 2 of the Marine Mammal Monitoring Plan found in Appendix E of the Application must monitor harassment zones during all in-water construction activities. One PSO would be stationed in close proximity to the construction site. A second PSO would be stationed at Bay Terrace Road which is located east of the Bridge 6.3 on the southern side of the Ship Canal. This location would provide views of ensonified areas radiating into Shilshole Bay as well as waters east of the mouth of the Ship Canal. A third PSO would be located on the north side of the Ship Canal at the Northwest 60th Street Viewpoint west of Bridge 6.3. This location provides views westward towards the mouth of the Ship Canal. A fourth PSO must be on a boat positioned in Puget Sound when a wire saw is being utilized to monitor the extended Level B harassment zone associated with this equipment. A wire saw would be employed on approximately 6 in-water work days. If hydroacoustic monitoring results of diamond wire saw cutting activities show that the entirety of the Level B harassment zone may be viewed by from land-based PSOs, then the PSO on the boat may not be deployed. All results from hydroacoustic monitoring, described in the next section, must be submitted to NMFS. NMFS must approve the removal of the boat-based PSO and modification of the new harassment isopleth.

Monitoring will be conducted 30 minutes before, during, and 30 minutes after drilling, clipping, cutting, pile driving/removal activities. In addition, observers shall record all incidents of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being

driven or removed. Drilling, clipping, cutting, Pile driving activities include the time to install or remove a single pile or series of piles, as long as the time elapsed between uses of the drilling, clipping, cutting, pile driving equipment is no more than 30 minutes.

Hydroacoustic Monitoring

Hydroacoustic monitoring will be conducted during in-water pile-driving and wire saw activities and recorded source levels will be compared to the reported sound levels employed as part of this application to determine harassment isopleths modeled in this application. Information about methods, data collection, and reporting are described in the Acoustic Monitoring Plan in Appendix F of the Application. The following representative subsets will be measured:

- A minimum of 15, 36-inch impact driven piles for the Project in the following subsets:
    1. A minimum of 5 piles towards the beginning of pile driving activity;
    2. A minimum of 5 piles towards the middle of pile driving activity;
    3. A minimum of 5 piles towards the latter pile driving activity.
- A minimum of 4, 48-inch drilled shafts oscillated for the Project in the following subsets:
    1. A minimum of 2 drilled shafts towards the beginning of the activity;
    2. A minimum of 2 drilled shafts towards the end of the activity.
- A minimum of 2 48-inch drilled shafts will be monitored when cut with a wire saw.

Reporting

BNSF must submit its draft reports on all monitoring conducted under the IHAs within 90 calendar days of the completion of monitoring or 60 calendar days prior to the requested issuance of any subsequent IHA for construction activity at the same location, whichever comes first. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are

received from NMFS within 30 calendar days of receipt of the draft report, the report shall be considered. The report will include an overall description of work completed, a narrative regarding marine mammal sightings, and associated PSO data sheets. Specifically, the report must include:

- Dates and times (begin and end) of all marine mammal monitoring;
- Construction activities occurring during each daily observation period, including how many and what type of piles were driven or removed and by what method: drilling, cutting, clipping, impact driving, and vibratory driving and removal ; duration of driving time for each pile (vibratory) and number of strikes per pile (impact driving);
- PSO locations during marine mammal monitoring;
- Environmental conditions during monitoring periods (at beginning and end of PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance;
- Name of PSO who sighted the animal(s) and PSO location and activity at time of sighting;
- Time of sighting;
- Identification of the animal(s) (e.g., genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;
- Distance and location of each observed marine mammal relative to the pile being driven for each sighting;
- Estimated number of animals (min/max/best estimate);
- Estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.);

- Animal's closest point of approach and estimated time spent within the harassment zone;
- Description of any marine mammal behavioral observations (*e.g.*, observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (*e.g.,* no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);
- Number of marine mammals detected within the harassment zones, by species; and
- Detailed information about implementation of any mitigation (*e.g.*, shutdowns and delays), a description of specific actions that ensued, and resulting changes in behavior of the animal(s), if any.

The acoustic monitoring report must contain the informational elements described in the Acoustic Monitoring Plan and, at minimum, must include:

- Hydrophone equipment and methods: recording device, sampling rate, distance (m) from the pile where recordings were made; depth of water and recording device(s);
- Type and size of pile being driven or cut, substrate type, method of driving or cutting during recordings (*e.g.*, hammer model and energy), and total pile driving or cutting duration;
- Whether a sound attenuation device is used and, if so, a detailed description of the device used and the duration of its use per pile;
- For impact pile driving (per pile): Number of strikes; depth of substrate to penetrate; pulse duration and mean, median, and maximum sound levels (dB re: 1 µPa): root mean square sound pressure level (SPLrms); cumulative sound

exposure level (SELcum), peak sound pressure level (SPLpeak), and single-strike sound exposure level (SELs-s);

- For wire saw cutting (per pile): Duration of driving per pile; mean, median, and maximum sound levels (dB re: 1 µPa): root mean square sound pressure level (SPLrms), cumulative sound exposure level (SELcum) (and timeframe over which the sound is averaged); and
- One-third octave band spectrum and power spectral density plot.

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder shall report the incident to the Office of Protected Resources (OPR) (301-427-8401), NMFS and to the West Coast Region Stranding Hotline (866-767-6114) as soon as feasible. If the death or injury was clearly caused by the specified activity, the IHA-holder must immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the IHA. The IHA-holder must not resume their activities until notified by NMFS.

The report must include the following information:

i. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);

ii. Species identification (if known) or description of the animal(s) involved;

iii. Condition of the animal(s) (including carcass condition if the animal is dead);

iv. Observed behaviors of the animal(s), if alive;

v. If available, photographs or video footage of the animal(s); and

vi. General circumstances under which the animal was discovered.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, this introductory discussion of our analyses applies to all of the species listed in Table 13, given that many of the anticipated effects of this project on different marine mammal stocks are expected to be relatively similar in nature. Where there are meaningful differences between species or stocks in anticipated individual responses to activities, impact of expected take on the population due to differences in population status, or impacts on habitat, they are described independently in the analysis below, such as for the potential repeated and prolonged exposure of habituated harbor seals that feed on salmonids traversing through the lock system. The analysis below applies to both the Year 1 and Year 2 authorized IHAs, except where noted otherwise.

Drilling, clipping, cutting, Pile driving and removal activities associated with the project, as outlined previously, have the potential to disturb or displace marine mammals. Specifically, the specified activities may result in take, in the form of Level A harassment and Level B harassment from underwater sounds generated by drilling, clipping, cutting, pile driving and removal. Potential takes could occur if marine mammals are present in zones ensonified above the thresholds for Level A or Level B harassment, identified above, while activities are underway.

The nature of the drilling, clipping, cutting, pile driving project precludes the likelihood of serious injury or mortality. The mitigation is expected to ensure that no Level A harassment occurs to any species except harbor seal. The nature of the estimated takes anticipated to occur are similar among all species and similar in Year 1 and Year 2, other than the potential Level A harassment take of harbor seal in Year 1, described further below and the likely comparatively higher number of repeated takes of some small number of harbor seals by Level B harassment during both Year 1 and Year 2

For all species other than harbor seal, take would be limited to Level B harassment (behavioral disturbance and TTS) only. Effects on individuals that are taken by Level B harassment, on the basis of reports in the literature as well as monitoring from other similar activities, will likely include reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring). Marine mammals present in the vicinity of the action area and taken by Level B harassment are most likely to move away from and avoid the area of elevated noise levels during in-water construction activities. The project site itself is located along a highly developed waterfront with high amounts of vessel traffic and, therefore, we expect that most animals disturbed by project sound would simply avoid the area and use more-preferred habitats. These short-term behavioral effects are not expected to affect marine mammals' fitness, survival, and reproduction due to the limited geographic area that would be affected in

comparison to the much larger habitat for marine mammals in the Puget Sound. Harbor seals that are habituated to in-water construction noise could be exposed for 5.4 hours per day for up to 10 consecutive days during impact driving activities in Year 1 only. These animals would likely remain in close proximity to the locks and may be exposed to enough accumulated energy to result in TTS or PTS (described below). Longer duration exposure could result in TTS in some cases if exposures occur within the Level B TTS zone. As discussed earlier in this document, TTS is a temporary loss of hearing sensitivity when exposed to loud sound, and the hearing threshold is expected to recover completely within minutes to hours. Any behavioral effects of repeated or long duration exposures are not expected to negatively impact survival or reproductive success of any individuals. Similarly, given that the exposure to these individuals is not expected to exceed 10 consecutive days for 5.4 or fewer hours at a time for any individual, any limited energetic impacts from the interruption of foraging or other important behaviors are not expected to affect the reproductive success of any individual harbor seals.

In addition to the expected effects resulting from authorized Level B harassment, we anticipate that a limited number of habituated harbor seals (20) may sustain some Level A harassment in the form of auditory injury during 10 days of impact driving planned for Year 1 only. However, any animals that experience PTS would likely only receive slight PTS, *i.e.* minor degradation of hearing capabilities within regions of hearing that align most completely with the frequency range of the energy produced by pile driving (*i.e.*, the low-frequency region below 2kHz), not severe hearing impairment or impairment in the reigns of greatest hearing sensitivity. If hearing impairment does occur, it is most likely that the affected animal would lose a few dBs in its hearing sensitivity, which in most cases, is not likely to meaningfully affect its ability to forage and communicate with conspecifics. These takes by Level A harassment (*i.e.*, a small degree of PTS) of habituated harbor seals are not expected to accrue in a manner that

would affect the reproductive success or survival of any individuals, much less result in adverse impacts on the species or stock. As described above, we expect that marine mammals would be likely to move away from a sound source that represents an aversive stimulus, especially at levels that would be expected to result in PTS, given sufficient notice through use of soft start.

The project is also not expected to have significant adverse effects on affected marine mammals' habitats. The project activities will not modify existing marine mammal habitat for a significant amount of time. The activities may cause some fish to leave the area of disturbance, thus temporarily impacting marine mammals' foraging opportunities in a limited portion of the foraging range; but, because of the short duration of the activities and the relatively small area of the habitat that may be affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences.

Portions of the southern resident killer whale range are within the project area and the entire Puget Sound is designated as critical habitat for these whales under the ESA. However, BNSF would be required to shut down and suspend pile driving or pile removal activities when this stock is detected in the vicinity of the project area. We anticipate that take of southern resident killer whale would be avoided. There are no other known important areas for other marine mammals, such as feeding or pupping, areas.

In summary and as described above, the following factors primarily support our determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality or serious injury is anticipated or authorized.
- For all species except harbor seal and only during Year 1, no Level A harassment is anticipated or authorized.

- The Level A harassment exposures to habituated harbor seals in Year 1 only are anticipated to result in slight PTS, within the lower frequencies associated with impact pile driving.
- Though a small number of habituated harbor seals will accrue Level B harassment in the form of TTS from repeated days of exposure, hearing thresholds are expected to completely recover within minutes to hours.
- Anticipated effects of Level B harassment in the form of behavioral modification would be temporary.
- Although a small portion of the southern resident killer whale critical habitat is within the project area, strict mitigation measures such as implementing shutdown measures and suspending pile driving are expected to avoid take of this stock. No other important habitat for marine mammals exist in the vicinity of the project area.
- We do not expect significant or long-term negative effects to marine mammal habitat.

Year 1 IHA – Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the required monitoring and mitigation measures, NMFS finds that the total marine mammal take from BNSF's construction activities will have a negligible impact on all affected marine mammal species or stocks.

Year 2 IHA – Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the required monitoring and mitigation measures, NMFS finds that the total marine mammal take from BNSF's construction activities will have a negligible impact on all affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under sections 101(a)(5)(A) and (D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. When the predicted number of individuals to be taken is fewer than one third of the species or stock abundance, the take is considered to be of small numbers. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

The amount of take NMFS has authorized is below one third of the estimated stock abundance for all species during both Year 1 and Year 2. The authorized take of individuals during Year 1 is less than 32.6 percent for harbor seals and less than 1 percent for all other authorized species. During year 2 the authorized take of individuals is less than 5.2 percent of the abundance of the affected species or stock as shown in Table 13. Note that harbor seal take during Year 1 likely includes multiple repeated takes of some small group of individuals. Similarly, for all other authorized species, the authorized take numbers probably represent conservative estimates because they assume all takes are of different individual animals, which is unlikely to be the case. Some individuals may return multiple times in a day, but PSOs would count them as separate takes if they cannot be individually identified.

Year 1 IHA- Based on the analysis contained herein of the activity (including the mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks in Year 1 of the project.

Year 2 IHA- Based on the analysis contained herein of the activity (including the mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks in Year 2 of the project.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we authorize take for endangered or threatened species.

No incidental take of ESA-listed species is authorized or expected to result from this activity. Therefore, NMFS has determined that formal consultation under section 7 of the ESA is not required for this action.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our action (*i.e.*, the issuance of an IHA) with respect to potential impacts on the human environment.

This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion

Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has determined that the issuance of the IHAs qualifies to be categorically excluded from further NEPA review

Authorizations

As a result of these determinations, NMFS has issued two distinct and consecutive one-year IHAs to BNSF for construction associated with the Railway Bridge 0050-0006.3 Heavy Maintenance Project in King County, Washington from July 16, 2022 to July 15, 2023 (Year 1) and from July 16, 2023 to July 15, 2024 (Year 2) provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: April 12, 2022.

Catherine Marzin,

Deputy Director, Office of Protected Resources,

National Marine Fisheries Service.

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